

analyzing and dispersing the radiation modified by and collected from the sample to provide a polarimetric spectrum, wherein no substantial relative change in polarization state between the radiation and the sample beam is caused by relative motion between optical elements employed in the focusing, collecting and analyzing; and

deriving information on optically detectable properties of the sample from said polarimetric spectrum.

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90. The method of claim 89, further comprising splitting a beam of broadband radiation into said polarized sample beam and a reference beam; wherein said focusing focuses said sample beam onto the sample.

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91. The method of claim 90, further comprising detecting the reference beam to provide a reference spectrum; and wherein said deriving comprises comparing said polarimetric spectrum and said reference spectrum to obtain said information of the sample.

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92. The method of claim 91, said beam and said reflected and reference spectra comprising multiple wavelengths in a range from about 190 nm to about 830 nm.

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93. The method of claim 90, said splitting comprising directing the beam to a mirror placed less than completely across said radiation beam.

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94. The method of claim 90, said splitting comprising deflecting a portion of said beam into a sample beam, the undeflected portion of the radiation defining a reference radiation beam.

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95. The method of claim 89, further comprising passing a beam of radiation through a polarizer to obtain the sample beam, wherein said analyzing analyzes by means of an

analyzer, and wherein during the focusing and analyzing, the polarizer and analyzer do not rotate.

8 ~~96~~. The method of claim ~~89~~, further comprising polarizing a beam of broadband radiation to provide said polarized beam, wherein said focusing focuses said polarized beam such that a beam having a multitude of polarization states is focused onto the sample, wherein said polarization states are functions of an angle ϕ to a reference plane normal to a sample surface, said angle ϕ having a range defining a substantial angle of an illumination aperture.

9 ~~97~~. The method of claim ~~96~~, wherein said focusing focuses said polarized beam along different planes of incidence onto the sample, said planes being at different angles ϕ to the reference plane, the range of said angle of the illumination aperture being about 90 or 180 degrees.

10 ~~98~~. The method of claim ~~89~~, wherein said focusing and collecting employ a common objective.

11 ~~99~~. The method of claim ~~89~~, said sample having different optically detectable properties along at least two axes, wherein said focusing or collecting employs an aperture centered about one of said axes.

12 ~~100~~. The method of claim ~~99~~, wherein said focusing and collecting are repeated employing at least two different apertures aligned respectively about at least two of said axes.

13 ~~101~~. The method of claim ~~100~~, wherein said focusing and collecting are repeated employing at least two different apertures centered respectively about at least two of said axes.

14 ~~102.~~ The method of claim ~~89~~, wherein said focusing and collecting are repeated employing two different apertures to detect presence or absence of a difference in optically detectable properties along at least two axes of the sample.

15 ~~103.~~ The method of claim ~~89~~, said polarimetric spectrum comprising multiple wavelengths in a range from about 190 nm to about 830 nm.

16 ~~104.~~ The method of claim ~~89~~, wherein said analyzing analyzes the radiation modified by the sample with respect to a predetermined and fixed polarization plane.

17 ~~105.~~ The method of claim ~~89~~, further comprising altering phase of the radiation modified by and collected from the sample prior to analyzing and dispersing it.

18 ~~106.~~ The method of claim ~~105~~, wherein said altering retards said phase of the modified and collected radiation by about $\pi/4$ radians.

19 ~~107.~~ The method of claim ~~89~~, wherein said focusing focuses said sample beam so that it surrounds a line normal to a surface of the sample.

20 ~~108.~~ The method of claim ~~89~~, the radiation in said beam comprising at least one ultraviolet or deep ultraviolet wavelength.

21 ~~109.~~ The method of claim ~~89~~, further comprising:

providing a reference beam;

detecting the reference beam to provide a reference spectrum; and

wherein said deriving comprises comparing said spectrum and said reference spectrum to obtain said information of the sample.

110. The method of claim 89, said focusing or collecting being performed at least twice and within at least two different ranges of angles to a reference plane normal to a sample surface.

111. The method of claim 110, said sample having different optically detectable properties along at least two axes, wherein said focusing or collecting are repeated employing at least two different apertures each aligned or centered respectively about one of said axes.

112. The method of claim 111, wherein said at least two different apertures are substantially 90 degrees apart.

113. The method of claim 89, wherein said focusing, collecting, dispersing and deriving are performed twice, once with polarization states of the sample beam and/or those of the modified and collected radiation within a first range of angles to a reference plane normal to a sample surface, and another time with said polarization states within a second different range of angles to the reference plane.

114. The method of claim 113, further comprising polarizing the sample beam before it reaches the sample, and/or analyzing the radiation modified by and collected from the sample with a polarizing element so that radiation of the sample beam and/or the modified and collected radiation is polarized, with the polarizing element in two different positions when the focusing, collecting, dispersing and deriving are performed twice.

115. The method of claim 114, wherein said two different positions are substantially 90 degrees apart by rotation.

116. An apparatus for measuring optically detectable properties of a sample, comprising:

first optics focusing a polarized sample beam of broadband radiation onto the surface of the sample, the sample beam having a multitude of polarization states, wherein said sampling beam is focused along directions substantially surrounding a line normal to said sample;

second optics collecting radiation modified by the sample, said second optics comprising an objective; and

an instrument analyzing and dispersing the radiation modified by and collected from the sample to provide a polarimetric spectrum, wherein no substantial relative change in polarization state between the radiation and the sample beam is caused by relative motion between the first and second optics and the instrument;

wherein said information on optically detectable properties of the sample is derivable from said polarimetric spectrum.

29 117. The apparatus of claim 116, further comprising:

a radiation source providing a beam of broadband radiation; and

third optics splitting said beam of broadband radiation into said polarized sample beam and said reference beam, wherein said first optics focuses said sample beam onto the sample so that the focused beam has a multitude of polarization states, wherein said polarization states are functions of an angle ϕ to a reference plane normal to a sample surface, said angle ϕ having a range defining a substantial angle of an illumination aperture.

30 118. The apparatus of claim 117, wherein said first optics focuses said polarized beam along different planes of incidence onto the sample, said planes being at different angles

.phi. to the reference plane, said angle of the illumination aperture being about 90 or 180 degrees.

31 ~~119~~ 29 The apparatus of claim ~~117~~, said third optics comprising a totally reflecting mirror placed less than completely across said beam.

32 ~~120~~ 29 The apparatus of claim ~~117~~, said third optics deflecting a portion of said radiation in the beam from the source into a sample beam, the undeflected portion of the radiation defining a reference radiation beam.

33 ~~121~~ 29 The apparatus of claim ~~117~~, wherein information on optically detectable properties of the sample is derivable from a comparison of said polarimetric spectrum and said reference spectrum.

34 ~~122~~ 33 The apparatus of claim ~~121~~, said radiation beam and said polarimetric and reference spectra comprising multiple wavelengths in a range from about 190 nm to about 830 nm.

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35 ~~123~~ 29 The apparatus of claim ~~117~~, wherein said third optics comprises a polarizing beam splitter.

36 ~~124~~ 29 The apparatus of claim ~~117~~, wherein said third optics comprise a beam divider, said apparatus further comprising a polarizer.

37 ~~125~~ 36 The apparatus of claim ~~124~~, said polarizer being in an optical path to the first optics and forms a part of the instrument.

38 ~~126~~ 38 The apparatus of claim ~~124~~, said polarizer being in an optical path to the first optics, said instrument comprising an analyzer in an optical path from the second optics.

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127. The apparatus of claim 116, said instrument comprising an analyzer, said apparatus further comprising a polarizer passing a beam of broadband radiation to form said polarized sample beam, wherein during the focusing by the first optics and analyzing by the instrument, the polarizer and analyzer do not rotate.

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128. The apparatus of claim 116, wherein said first and second optics comprise a common objective that focuses the sample beam onto and collects radiation modified by the sample.

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129. The apparatus of claim 116, further comprising a flip-in polarizer and a device moving the polarizer into and out of a path of the beam of broadband radiation from a radiation source to provide the sample beam that is polarized or unpolarized.

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130. The apparatus of claim 129, wherein said polarizer polarizes the beam originating from the source and analyses the radiation modified by and collected from the sample.

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131. The apparatus of claim 116, further comprising a source of radiation, wherein said first optics focuses radiation from the source onto the sample, said sample having different optically detectable properties along at least two axes, said apparatus further comprising at least one aperture aligned with one of said axes, said aperture being in an optical path between the source and the instrument.

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132. The apparatus of claim 131, wherein said at least one aperture is centered about said one of the axes.

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133. The apparatus of claim 131, further comprising a mechanism selecting one of at least two apertures to be aligned with one of the axes.

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46 134. The apparatus of claim 133, wherein said mechanism causes each of two different apertures to be aligned with a corresponding one of the axes, so that the polarimetric spectra obtained when the two apertures are aligned consecutively with their corresponding axes yields information on optically detectable properties of the sample.

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135. The apparatus of claim 134, wherein said mechanism comprise a wheel with at least two apertures therein.

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136. The apparatus of claim 135, wherein said wheel comprise a polarizer in each of the at least two apertures.

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137. The apparatus of claim 135, wherein two of said at least two apertures have shapes substantially in the shape of a circle with one quadrant blocked.

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138. The apparatus of claim 116, further comprising a source of radiation, wherein said first optics focuses radiation from the source onto the sample, said sample having different optically detectable properties along at least two axes, said apparatus further comprising a mechanism rotating a linear polarizer in an optical path of the sample beam for detecting said axes.

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139. The apparatus of claim 116, said broadband radiation comprising multiple wavelengths in a range from about 190 nm to about 830 nm.

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140. The apparatus of claim 116, wherein said instrument analyzes the radiation modified by the sample with respect to a predetermined and fixed polarization plane.

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141. The apparatus of claim 116, further comprising a phase retarder in an optical path between the second optics and the instrument, said retarder altering phase of the modified radiation collected from the sample prior to analyzing and dispersing it.

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142. The apparatus of claim 141, wherein said retarder retards said phase of the modified and collected radiation by about $\pi/4$ radians.

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143. The apparatus of claim 116, said first or second optics comprising a mirror having a coating that introduces a total change in phase of radiation reflected by it by the first and second optics of about $\pi/2$ radians.

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144. The apparatus of claim 116, wherein said sample beam surrounds a line normal to a surface of the sample.

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145. The apparatus of claim 116, further comprising a common polarizing element that polarizes a sample beam before it is focused by the first optics, and that analyzes the radiation modified by and collected from the sample.

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146. The apparatus of claim 145, wherein said common polarizing element comprises a polarizer or a polarizing beam splitter.

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147. The apparatus of claim 116, further comprising a xenon and/or deuterium lamp supplying radiation.

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148. The apparatus of claim 116, wherein said focusing, collecting and dispersing are performed twice, once with polarization states of the sample beam and/or those of the modified and collected radiation within a first range of angles to a reference plane normal to a sample surface, and another time with said polarization states within a second different range of angles to the reference plane.

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149. The apparatus of claim 116, further comprising a polarizing element polarizing the sample beam before it reaches the sample, and/or analyzing the radiation modified by and collected from the sample to polarize the sample beam and/or the modified and collected

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radiation, and an instrument moving the element between at least two different positions where the focusing, collecting and dispersing are performed.

62-150. The apparatus of claim 149, wherein said two different positions are substantially 90 degrees apart by rotation.

63-151. A method for obtaining information of one or more layers of a sample, said method comprising:

focusing a polarized first sample beam of broadband radiation onto the one or more layers, said beam having a multitude of polarization states;

collecting radiation that originates from the first beam and that is modified by the one or more layers of the sample by means of an objective;

analyzing and dispersing the radiation modified and collected from the sample to provide a polarimetric spectrum;

focusing a polarized second beam of radiation at said one or more layers in a direction at an oblique angle to the one or more layers;

obtaining measurements of changes in polarization state in amplitude and phase of the radiation that has been modified by the one or more layers and that originates from the second beam; and

determining information on optically detectable properties of said one or more layers from said measurements and the polarimetric spectrum.

64-152. The method of claim 151, wherein said first and second beams of radiation are focused to substantially the same area of said one or more layers.

65 ~~153~~. The method of claim ~~151~~, wherein said first and second beams of radiation are focused to the one or more layers substantially simultaneously, and said collecting, analyzing and obtaining are performed substantially simultaneously.

66 ~~154~~. The method of claim ~~151~~, further comprising splitting a beam of broadband radiation into said first beam and a reference beam; wherein said first beam focusing focuses said first beam onto the one or more layers.

67 ~~155~~. The method of claim ~~154~~, further comprising detecting the reference beam to provide a reference spectrum; and wherein said determining comprises comparing said polarimetric spectrum and said reference spectrum.

68 ~~156~~. The method of claim ~~154~~, said splitting comprising directing the beam of broadband radiation to a mirror placed less than completely across said radiation beam.

69 ~~157~~. The method of claim ~~154~~, said splitting comprising deflecting a portion of said beam of broadband radiation into a sample beam, the undeflected portion of the radiation defining a reference radiation beam.

70 ~~158~~. The method of claim ~~151~~, further comprising polarizing a beam of broadband radiation to provide a polarized beam, wherein said focusing focuses such polarized beam such that the first polarized sample beam having a multitude of polarization states is focused onto the sample.

71 ~~159~~. The method of claim ~~158~~, wherein said focusing focuses said polarized beam along different planes of incidence onto the sample.

72 ~~160~~. The method of claim ~~151~~, wherein said first beam focusing and collecting employ a common objective.

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73, 74 161. The method of claim 151, said polarimetric spectrum comprising multiple wavelengths in a range from about 190 nm to about 830 nm.

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74 162. The method of claim 151, wherein said analyzing and dispersing analyze the radiation modified by the sample with respect to a predetermined and fixed polarization plane.

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163. The method of claim 151, wherein the second beam focusing focuses a polarized second laser beam at said one or more layers, said obtaining obtains measurements of changes in polarization state caused by the one or more layers at the wavelength of the laser, and said determining determines the refractive indices of the one or more layers over said polarimetric spectrum.

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164. The method of claim 151, wherein the second beam focusing focuses a polarized second beam of broadband radiation at said one or more layers, said obtaining obtains measurements of changes in polarization state caused by the one or more layers over a spectrum of the second beam, and said determining determines the refractive indices of the one or more layers over a combined spectrum of the first and second beams.

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165. The method of claim 164, said combined spectrum comprising multiple wavelengths in a range from about 190 nm to about 830 nm.

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166. The method of claim 151 further comprising altering phase of the radiation modified by and collected from the sample prior to analyzing and dispersing it.

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167. The method of claim 166, wherein said altering retards said phase of the modified and collected radiation by about $\pi/4$ radians.

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168. An apparatus for obtaining information of one or more layers of a sample, said apparatus comprising:

first optics focusing a first polarized sample beam of broadband radiation to the one or more layers, and a second sample beam of polarized radiation at said one or more layers in a direction at an oblique angle to the one or more layers;

second optics collecting radiation that originates from the first beam and that is modified by the one or more layers of the sample, said second optics comprising an objective;

an instrument analyzing and dispersing the radiation modified and collected from the sample to provide a polarimetric spectrum; and

an ellipsometer obtaining measurements of changes in polarization state in amplitude and phase of the modified radiation from the one or more layers originating from second beam;

wherein information on optically detectable properties of said one or more layers is derivable from the measurements of the ellipsometer and the polarimetric spectrum.

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169. The apparatus of claim 168, wherein said first optics focuses the first and second beams of radiation to substantially the same area of said one or more layers.

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170. The apparatus of claim 168, wherein said instrument comprises a spectrometer.

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171. The apparatus of claim 168, wherein said first optics focuses the first and second beams of radiation to the one or more layers substantially simultaneously, and said second optics, the instrument and the ellipsometer perform their respective functions substantially simultaneously.

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172. The apparatus of claim 168, further comprising:

a radiation source providing a beam of broadband radiation; and

third optics splitting said beam of broadband radiation into said polarized first beam and a reference beam, wherein said first optics focuses said first beam onto the one or more layers of the sample so that the focused beam has a multitude of polarization states.

85 173. The apparatus of claim 172, wherein said third optics splits said beam from the source into a polarized sample beam and a polarized reference beam.

86 174. The apparatus of claim 173, said third optics comprising a totally reflecting mirror placed less than completely across said beam.

87 175. The apparatus of claim 173, said third optics deflecting a portion of said radiation in the beam from the source into a sample beam, the undeflected portion of the radiation defining a reference radiation beam.

88 176. The apparatus of claim 173, wherein said third optics comprises a polarizing beam splitter.

89 177. The apparatus of claim 173, wherein said third optics comprises a beam divider, said apparatus further comprising a polarizer.

90 178. The apparatus of claim 177, said polarizer being in an optical path to the first optics and forms a part of the instrument.

91 179. The apparatus of claim 177, said polarizer being in an optical path to the first optics, said instrument comprising an analyzer in an optical path from the second optics.

92 180. The apparatus of claim 168, further comprising a detector detecting the reference beam to provide a reference spectrum, wherein said information is derivable by comparing said polarimetric spectrum and said reference spectrum.

93 ~~181.~~ The apparatus of claim ~~180~~⁹², said polarimetric and reference spectra comprising multiple wavelengths in a range from about 190 nm to about 830 nm.

94 ~~182.~~ The apparatus of claim ~~168~~⁸⁰, said instrument comprising an analyzer, said apparatus further comprising a polarizer polarizing a beam of broadband radiation to generate the first polarized sample beam, wherein said analyzer and the polarizer do not rotate when radiation from the first and second beams is modified by the sample and collected, dispersed, analyzed and measured.

95 ~~183.~~ The apparatus of claim ~~168~~⁸⁰, wherein said first optics focuses said polarized beam along different planes of incidence onto the sample.

96 ~~184.~~ The apparatus of claim ~~168~~⁸⁰, wherein said first and second optics comprise a common objective that focuses the first beam onto and collects radiation modified by the one or more layers at the surface of the sample.

97 ~~185.~~ The apparatus of claim ~~168~~⁸⁰, further comprising a flip-in polarizer and a mechanism moving the polarizer into and out of a path of a beam of broadband radiation from a radiation source to provide the first sample beam that is focused by the first optics.

98 ~~186.~~ The apparatus of claim ~~185~~⁹², wherein said polarizer polarizes the beam originating from the source to provide the first sample beam and analyses the radiation that is modified by the sample and collected by the second optics and that originates from the first beam.

99 ~~187.~~ The apparatus of claim ~~168~~⁸⁰, said broadband radiation of the first and second beams comprising multiple wavelengths in a range from about 190 nm to about 830 nm.

100 188. The apparatus of claim 168, wherein said instrument analyzes the radiation modified by the surface of the sample and from the first sample beam with respect to a predetermined and fixed polarization plane.

101 189. The apparatus of claim 168, wherein said second beam is a laser beam whose wavelength is in the polarimetric spectrum, wherein the ellipsometer is a single wavelength ellipsometer that obtains measurements of changes in polarization state caused by the one or more layers at the wavelength of the laser, and wherein thickness information and refractive indices of the one or more layers are derivable over said polarimetric spectrum.

102 190. The apparatus of claim 168, said second beam having wavelengths in a broadband, wherein the ellipsometer is a spectroscopic ellipsometer that obtains measurements of changes in polarization state caused by the one or more layers over the spectrum of the second beam, and said determining determines the refractive indices of the one or more layers over a combined spectrum of the first and second beams.

103 191. The method of claim 190, said combined spectrum comprising multiple wavelengths ranging from about 190 nm to about 830 nm.

104 192. The apparatus of claim 168, said first or second optics comprising a mirror having a coating that introduces a total change in phase of radiation reflected by it by the first and second optics of about $\pi/2$ radians.

105 193. A method for measuring optically detectable properties of a sample, comprising:
focusing a sample beam of radiation onto the sample, the radiation in said beam comprising at least one ultraviolet or deep ultraviolet wavelength;
collecting radiation modified by the sample;

dispersing the radiation modified by and collected from the sample to provide a spectrum, wherein no substantial relative change in polarization state between the radiation and the sample beam is caused by relative motion between optical elements employed in the focusing and collecting, wherein the radiation in the sample beam and/or the dispersed radiation is polarized; and

deriving information on optically detectable properties of the sample from said spectrum.

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194. The method of claim 193, further comprising:

providing a reference beam;

detecting the reference beam to provide a reference spectrum; and

wherein said deriving comprises comparing said spectrum and said reference spectrum to obtain said information of the sample.

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195. The method of claim 193, wherein radiation in the sample beam and/or radiation that is dispersed is polarized.

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196. The method of claim 195, further comprising polarizing the sample beam before it reaches the sample, and analyzing the radiation modified by and collected from the sample, by a common polarizing element.

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197. The method of claim 196, wherein said polarizing and analyzing are performed by means of a polarizer or a polarizing beam splitter.

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198. The method of claim 195, further comprising polarizing a beam of broadband radiation to provide said sample beam, wherein said focusing focuses said polarized sample

beam such that a beam having a multitude of polarization states is focused onto the sample, wherein said polarization states are functions of an angle ϕ to a reference plane normal to a sample surface, said angle ϕ having a range defining a substantial angle of an illumination aperture.

111 ~~199~~ 110 The method of claim ~~198~~, wherein said focusing focuses said polarized beam along different planes of incidence onto the sample, said planes being at different angles ϕ to the reference plane, the range of said angle of the illumination aperture being about 90 or 180 degrees.

112 ~~200~~ 105 The method of claim ~~193~~, said focusing or collecting being performed at least twice and within at least two different ranges of angles to a reference plane normal to a sample surface.

113 ~~201~~ 112 The method of claim ~~200~~, said sample having different optically detectable properties along at least two axes, wherein said focusing or collecting are repeated employing at least two different apertures each aligned or centered respectively about one of said axes.

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Cano 114 ~~202~~ 113 The method of claim ~~201~~, wherein said at least two different apertures are substantially 90 degrees apart.

115 ~~203~~ 105 The method of claim ~~199~~, wherein said focusing, collecting, dispersing and deriving are performed twice, once with polarization states of the sample beam and/or those of the modified and collected radiation within a first range of angles to a reference plane normal to a sample surface, and another time with said polarization states within a second different range of angles to the reference plane.

116 204. The method of claim 115, further comprising polarizing the sample beam before it reaches the sample, and/or analyzing the radiation modified by and collected from the sample with a polarizing element so that radiation of the sample beam and/or the modified and collected radiation is polarized, with the polarizing element in two different positions when the focusing, collecting, dispersing and deriving are performed twice.

117 205. The method of claim 116, wherein said two different positions are substantially 90 degrees apart by rotation.

118 206. A method for measuring optically detectable properties of a sample, comprising:

focusing a sample beam of radiation onto the sample;

collecting radiation modified by the sample;

dispersing the radiation modified by and collected from the sample to provide a spectrum, wherein no substantial relative change in polarization state between the radiation and the sample beam is caused by relative motion between optical elements employed in the focusing, collecting and analyzing;

deriving information on optically detectable properties of the sample from said spectrum; and

polarizing the sample beam before it reaches the sample and/or analyzing the radiation modified by and collected from the sample, wherein said focusing, collecting, dispersing and deriving are performed twice, once with polarization states of the sample beam and/or those of the modified and collected radiation within a first range of angles to a reference plane normal to a sample surface, and another time with said polarization states within a second different range of angles to the reference plane.

119 207. The method of claim 206, wherein said polarizing and/or analyzing is performed with a polarizing element so that radiation of the sample beam and/or the modified and collected radiation is polarized, with the polarizing element in two different positions when the focusing, collecting dispersing and deriving are performed twice.

120 208. The method of claim 207, wherein said two different positions are substantially 90 degrees apart by rotation.

121 209. The method of claim 207, further comprising polarizing the sample beam before it reaches the sample, and analyzing the radiation modified by and collected from the sample, by a common polarizing element.

122 210. The method of claim 209, wherein said polarizing and analyzing are performed by means of a polarizer or a polarizing beam splitter.

123 211. The method of claim 206, wherein the polarizing polarizes a beam of broadband radiation to provide said sample beam, wherein said focusing focuses said polarized sample beam such that a beam having a multitude of polarization states is focused onto the sample, wherein said polarization states are functions of an angle ϕ to a reference plane normal to a sample surface, said angle ϕ having a range defining a substantial angle of an illumination aperture.

124 212. The method of claim 211, wherein said focusing focuses said polarized sample beam along different planes of incidence onto the sample, said planes being at different angles ϕ to the reference plane, the range of said angle of the illumination aperture being about 90 or 180 degrees.

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123. The method of claim ~~206~~, the radiation in said sample beam comprising at least one ultraviolet or deep ultraviolet wavelength.

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124. The method of claim ~~206~~, further comprising:

providing a reference beam;

detecting the reference beam to provide a reference spectrum; and

wherein said deriving comprises comparing said spectrum and said reference spectrum to obtain said information of the sample.

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127. The method of claim ~~206~~, said focusing or collecting being performed twice and within two different ranges of angles to a reference plane normal to a sample surface.

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128. The method of claim ~~215~~, said sample having different optically detectable properties along at least two axes, wherein said focusing or collecting are performed twice employing at least two different apertures each aligned or centered respectively about one of said axes.

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127. The method of claim ~~216~~, wherein said at least two different apertures are substantially 90 degrees apart.

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128. A method for measuring optically detectable properties of a sample, comprising:

focusing a sample beam of radiation onto the sample;

collecting radiation modified by the sample;

dispersing the radiation modified by and collected from the sample to provide a spectrum, wherein no substantial relative change in polarization state between the radiation

and the sample beam is caused by relative motion between optical elements employed in the focusing, collecting and analyzing; and

deriving information on optically detectable properties of the sample from said spectrum;

said focusing or collecting being performed twice and within two different ranges of angles to a reference plane normal to a sample surface.

¹³¹~~219~~ The method of claim ¹³⁰~~218~~, said sample having different optically detectable properties along at least two axes, wherein said focusing or collecting are performed twice employing at least two different apertures each aligned or centered respectively about one of said axes.

¹³²~~220~~ The method of claim ¹³¹~~219~~, wherein said at least two different apertures are substantially 90 degrees apart.

¹³³~~221~~ The method of claim ¹³⁰~~218~~, further comprising polarizing the sample beam before it reaches the sample and/or analyzing the radiation modified by and collected from the sample, wherein said focusing, collecting and dispersing are performed twice, once with polarization states of the sample beam and/or those of the modified and collected radiation within a first range of angles to a reference plane normal to a sample surface, and another time with said polarization states within a second different range of angles to the reference plane.

¹³⁴~~222~~ The method of claim ¹³³~~221~~, wherein said polarizing is performed with a polarizing element so that radiation of the sample beam and/or the modified and collected

radiation is polarized, with the polarizing element in two different positions when the focusing, collecting and dispersing are performed twice.

135 223. The method of claim 222, wherein said two different positions are substantially 90 degrees apart by rotation.

136 224. The method of claim 222, wherein the radiation in the sample beam and/or the dispersed radiation is polarized.

137 225. The method of claim 224, further comprising polarizing the sample beam before it reaches the sample, and analyzing the radiation modified by and collected from the sample, by a common polarizing element.

138 226. The method of claim 225, wherein said polarizing and analyzing are performed by means of a polarizer or a polarizing beam splitter.

139 227. The method of claim 218, further comprising polarizing a beam of broadband radiation to provide said sample beam, wherein said focusing focuses said polarized sample beam such that a beam having a multitude of polarization states is focused onto the sample, wherein said polarization states are functions of an angle ϕ to a reference plane normal to a sample surface, said angle ϕ having a range defining a substantial angle of an illumination aperture.

140 228. The method of claim 227, wherein said focusing focuses said polarized sample beam along different planes of incidence onto the sample, said planes being at different angles ϕ to the reference plane, the range of said angle of the illumination aperture being about 90 or 180 degrees.

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141 | 229. The method of claim 218, the radiation in said sample beam comprising at least one ultraviolet or deep ultraviolet wavelength.

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142 | 230. The method of claim 218, further comprising:

providing a reference beam;

detecting the reference beam to provide a reference spectrum; and

wherein said deriving comprises comparing said spectrum and said reference spectrum to obtain said information of the sample.

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231. An apparatus for measuring optically detectable properties of a sample, comprising:

optics focusing a sample beam of radiation onto the sample, the radiation in said beam comprising at least one ultraviolet or deep ultraviolet wavelength;

a collector collecting radiation modified by the sample; and

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a device dispersing the radiation modified by and collected from the sample to provide a spectrum, wherein no substantial relative change in polarization state between the radiation and the sample beam is caused by relative motion between optical elements employed in the focusing and collecting, wherein the radiation in the sample beam and/or the dispersed radiation is polarized;

wherein information on optically detectable properties of the sample is derivable from said spectrum.

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232. The apparatus of claim 231, further comprising:

a source providing a reference beam; and

a detector detecting the reference beam to provide a reference spectrum;

wherein said information on optically detectable properties of the sample is derivable by a comparison of said spectrum and said reference spectrum.

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~~233~~ The apparatus of claim ~~231~~, wherein the radiation in the sample beam and/or the dispersed radiation is polarized.

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~~234~~ The apparatus of claim ~~231~~, further comprising a common polarizing element polarizing the sample beam before it reaches the sample, and analyzing the radiation modified by and collected from the sample.

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~~235~~ The apparatus of claim ~~231~~, wherein said polarizing and analyzing are performed by means of a polarizer or a polarizing beam splitter.

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~~236~~ The apparatus of claim ~~231~~, further comprising a polarizing element polarizing a beam of broadband radiation to provide said sample beam, wherein said focusing focuses said polarized sample beam such that a beam having a multitude of polarization states is focused onto the sample, wherein said polarization states are functions of an angle ϕ to a reference plane normal to a sample surface, said angle ϕ having a range defining a substantial angle of an illumination aperture.

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~~237~~ The apparatus of claim ~~236~~, wherein said optics focuses said polarized beam along different planes of incidence onto the sample, said planes being at different angles ϕ to the reference plane, the range of said angle of the illumination aperture being about 90 or 180 degrees.

158 238. The apparatus of claim 231, further comprising at least two apertures, said sample having different optically detectable properties along at least two axes, wherein said focusing or collecting are repeated employing at least two different apertures each aligned or centered respectively about one of said axes.

151 150 239. The apparatus of claim 238, wherein said at least two different apertures are substantially 90 degrees apart.

152 143 240. The apparatus of claim 231, wherein said focusing, collecting and dispersing are performed twice, once with polarization states of the sample beam and/or those of the modified and collected radiation within a first range of angles to a reference plane normal to a sample surface, and another time with said polarization states within a second different range of angles to the reference plane.

153 143 241. The apparatus of claim 231, further comprising a polarizing element polarizing the sample beam before it reaches the sample, and/or analyzing the radiation modified by and collected from the sample to polarize the sample beam and/or the modified and collected radiation, and an instrument moving the element between at least two different positions where the focusing, collecting and dispersing are performed.

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154 153 242. The apparatus of claim 241, wherein said two different positions are substantially 90 degrees apart by rotation.

155 143 243. The apparatus of claim 231, further comprising a xenon and/or deuterium lamp supplying radiation for the sample beam.

156 244. An apparatus for measuring optically detectable properties of a sample, comprising:

optics focusing a sample beam of radiation onto the sample;

a collector collecting radiation modified by the sample;

a device dispersing the radiation modified by and collected from the sample to provide a spectrum, wherein no substantial relative change in polarization state between the radiation and the sample beam is caused by relative motion between optical elements employed in the focusing, collecting and analyzing, wherein information on optically detectable properties of the sample is derivable from the spectrum;

a polarizing element polarizing the sample beam before it reaches the sample and/or analyzing the radiation modified by and collected from the sample; and

an instrument moving the element between at least two positions where said focusing, collecting and dispersing are performed, so that polarization states of the sample beam and/or those of the modified and collected radiation have different ranges of angles to a reference plane normal to a sample surface when said element is at said at least two positions.

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245. The apparatus of claim 244, wherein said two different positions are substantially 90 degrees apart by rotation.

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246. The apparatus of claim 244, said polarizing element polarizing the sample beam before it reaches the sample, and analyzing the radiation modified by and collected from the sample.

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247. The apparatus of claim 246, wherein said polarizing element comprises a polarizer or a polarizing beam splitter.

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160 248. The apparatus of claim 244, wherein the polarizing element polarizes a beam of broadband radiation to provide said sample beam, wherein said optics focuses said polarized sample beam such that a beam having a multitude of polarization states is focused onto the sample, wherein said polarization states are functions of an angle ϕ to a reference plane normal to a sample surface, said angle ϕ having a range defining a substantial angle of an illumination aperture.

161 249. The apparatus of claim 248, wherein said optics focuses said polarized sample beam along different planes of incidence onto the sample, said planes being at different angles ϕ to the reference plane, the range of said angle of the illumination aperture being about 90 or 180 degrees.

162 250. The apparatus of claim 244, the radiation in said sample beam comprising at least one ultraviolet or deep ultraviolet wavelength.

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163 251. The apparatus of claim 244, further comprising:

a source providing a reference beam;

a detector detecting the reference beam to provide a reference spectrum; and

wherein said information is derivable by comparing said spectrum and said reference spectrum.

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164 252. The apparatus of claim 244, said focusing or collecting being performed twice and within two different ranges of angles to a reference plane normal to a sample surface.

165 253. The apparatus of claim 252, further comprising at least two different apertures, said sample having different optically detectable properties along at least two axes, wherein

said optics focuses or the collector collects radiation through the at least two different apertures each aligned or centered respectively about one of said axes.

¹⁶⁶₂₅₄ The apparatus of claim ¹⁶⁵~~253~~, wherein said at least two different apertures are substantially 90 degrees apart.

¹⁶⁷₂₅₅ An apparatus for measuring optically detectable properties of a sample, comprising:

optics focusing a sample beam of radiation onto the sample;

a collector collecting radiation modified by the sample; and

a device dispersing the radiation modified by and collected from the sample to provide a spectrum, wherein no substantial relative change in polarization state between the radiation and the sample beam is caused by relative motion between optical elements employed in the focusing, collecting and analyzing,

wherein said information is derivable from the spectrum, and wherein said optics focuses radiation or the collector collects radiation at at least two different times within two different ranges of angles to a reference plane normal to a sample surface.

¹⁶⁸₂₅₆ The apparatus of claim ¹⁶⁸~~255~~, further comprising at least two different apertures, said sample having different optically detectable properties along at least two axes, wherein said optics focuses or the collector collects radiation through the at least two different apertures each aligned or centered respectively about one of said axes.

¹⁶⁹₂₅₇ The apparatus of claim ¹⁶⁸~~256~~, wherein said at least two different apertures are substantially 90 degrees apart.

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170 258. The apparatus of claim 255, further comprising a polarizing element polarizing the sample beam before it reaches the sample and/or analyzing the radiation modified by and collected from the sample.

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171 259. The apparatus of claim 258, further comprising an instrument moving the element between at least two positions where said focusing, collecting and dispersing are performed, so that polarization states of the sample beam and/or those of the modified and collected radiation have different ranges of angles to a reference plane normal to a sample surface when the element is at said at least two positions.

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260. The apparatus of claim 259, wherein said at least two different positions are substantially 90 degrees apart by rotation.

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173 261. The apparatus of claim 258, said polarizing element polarizing the sample beam before it reaches the sample, and analyzing the radiation modified by and collected from the sample.

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262. The apparatus of claim 261, wherein said polarizing element comprises a polarizer or a polarizing beam splitter.

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263. The apparatus of claim 258, said polarizing element polarizing a beam of broadband radiation to provide said sample beam, wherein said optics focuses said polarized sample beam such that a beam having a multitude of polarization states is focused onto the sample, wherein said polarization states are functions of an angle ϕ to a reference plane normal to a sample surface, said angle ϕ having a range defining a substantial angle of an illumination aperture.

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116 264. The apparatus of claim 263, wherein said optics focuses said polarized sample beam along different planes of incidence onto the sample, said planes being at different angles ϕ to the reference plane, the range of said angle of the illumination aperture being about 90 or 180 degrees.

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177 265. The apparatus of claim 255, the radiation in said sample beam comprising at least one ultraviolet or deep ultraviolet wavelength.

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178 266. The apparatus of claim 255, further comprising:

a source providing a reference beam; and

a detector detecting the reference beam to provide a reference spectrum;

wherein information on optically detectable properties of the sample is derivable from said spectrum and said reference spectrum.

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267. The apparatus of claim 255, further comprising a xenon and/or deuterium lamp supplying radiation for the sample beam.

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268. A method for obtaining information of one or more layers of a sample, said method comprising:

focusing a first sample beam onto the one or more layers, the radiation in said beam comprising at least one ultraviolet or deep ultraviolet wavelength;

collecting radiation that originates from the first beam and that is modified by the one or more layers of the sample;

dispersing the radiation modified and collected from the sample to provide a spectrum;

focusing a polarized second beam of radiation at said one or more layers in a direction at an oblique angle to the one or more layers;

obtaining measurements of changes in polarization state in amplitude and phase of the radiation that has been modified by the one or more layers and that originates from the second beam; and

deriving information on optically detectable properties of said one or more layers from said measurements and the spectrum.

181 269. The method of claim 268, further comprising:

providing a reference beam; and

detecting the reference beam to provide a reference spectrum;

wherein said information is derivable by comparing said spectrum and said reference spectrum.

182 270. The method of claim 268, further comprising polarizing the first sample beam before it reaches the sample, and analyzing the radiation modified by and collected from the sample, by a common polarizing element.

183 271. The method of claim 270, wherein said polarizing and analyzing are performed by means of a polarizer or a polarizing beam splitter.

184 272. The method of claim 268, further comprising polarizing a beam of broadband radiation to provide said first sample beam, wherein said first sample beam focusing focuses said polarized first sample beam such that a beam having a multitude of polarization states is focused onto the sample, wherein said polarization states are functions of an angle ϕ to a

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reference plane normal to a sample surface, said angle ϕ having a range defining a substantial angle of an illumination aperture.

185 ~~273.~~ The method of claim ~~272~~¹⁸⁴, wherein said first sample beam focusing focuses said polarized beam along different planes of incidence onto the sample, said planes being at different angles ϕ to the reference plane, the range of said angle of the illumination aperture being about 90 or 180 degrees.

186 ~~274.~~ The method of claim ~~268~~¹⁸⁰, said first sample beam focusing or collecting being performed at least twice and within at least two different ranges of angles to a reference plane normal to a sample surface.

187 ~~275.~~ The method of claim ~~269~~¹⁸¹, said sample having different optically detectable properties along at least two axes, wherein said first sample beam focusing or collecting are repeated employing at least two different apertures each aligned or centered respectively about one of said axes.

188 ~~276.~~ The method of claim ~~275~~¹⁸⁷, wherein said at least two different apertures are substantially 90 degrees apart.

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189 ~~277.~~ The method of claim ~~268~~¹⁸⁰, wherein said first sample beam focusing, collecting, dispersing and deriving are performed twice, once with polarization states of the first sample beam and/or those of the modified and collected radiation within a first range of angles to a reference plane normal to a sample surface, and another time with said polarization states within a second different range of angles to the reference plane.

190 ~~278.~~ The method of claim ~~277~~¹⁸⁹, further comprising polarizing the first sample beam before it reaches the sample, and/or analyzing the radiation modified by and collected from

the sample with a polarizing element so that radiation of the first sample beam and/or the modified and collected radiation is polarized, with the polarizing element in two different positions when the focusing, collecting, dispersing and deriving are performed twice.

191-¹⁹⁰ 279. The method of claim 278, wherein said two different positions are substantially 90 degrees apart by rotation.

192-²⁸⁰ 280. A method for obtaining information of one or more layers of a sample, said method comprising:

focusing a first sample beam of radiation onto the one or more layers;

collecting radiation that originates from the first beam and that is modified by the one or more layers of the sample;

dispersing the radiation modified and collected from the sample to provide a spectrum;

focusing a polarized second beam of radiation at said one or more layers in a direction at an oblique angle to the one or more layers;

obtaining measurements of changes in polarization state in amplitude and phase of the radiation that has been modified by the one or more layers and that originates from the second beam;

deriving information on optically detectable properties of said one or more layers from said measurements and the spectrum; and

polarizing the first sample beam before it reaches the sample and/or analyzing the radiation modified by and collected from the sample, wherein said first sample beam focusing, collecting, dispersing and deriving are performed twice, once with polarization

states of the first sample beam and/or those of the modified and collected radiation within a first range of angles to a reference plane normal to a sample surface, and another time with said polarization states within a second different range of angles to the reference plane.

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281. The method of claim 280, wherein said polarizing is performed with a polarizing element so that radiation of the first sample beam and/or the modified and collected radiation is polarized, with the polarizing element in two different positions when the focusing, collecting dispersing, deriving and polarizing are performed twice.

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282. The method of claim 281, wherein said two different positions are substantially 90 degrees apart by rotation.

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283. The method of claim 281, further comprising polarizing the first sample beam before it reaches the sample, and analyzing the radiation modified by and collected from the sample, by a common polarizing element.

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284. The method of claim 283, wherein said polarizing and analyzing are performed by means of a polarizer or a polarizing beam splitter.

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285. The method of claim 280, wherein the polarizing polarizes a beam of broadband radiation to provide said first sample beam, wherein said first sample beam focusing focuses said polarized first sample beam such that a beam having a multitude of polarization states is focused onto the sample, wherein said polarization states are functions of an angle ϕ to a reference plane normal to a sample surface, said angle ϕ having a range defining a substantial angle of an illumination aperture.

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286. The method of claim 285 wherein said first sample beam focusing focuses said polarized first sample beam along different planes of incidence onto the sample, said planes

being at different angles ϕ to the reference plane, the range of said angle of the illumination aperture being about 90 or 180 degrees.

199 ¹⁹² 287. The method of claim ~~280~~, the radiation in said first sample beam comprising at least one ultraviolet or deep ultraviolet wavelength.

200 ¹⁹² 288. The method of claim ~~280~~, further comprising:

providing a reference beam;

detecting the reference beam to provide a reference spectrum; and

wherein said deriving comprises comparing said spectrum and said reference spectrum.

201 ¹⁹² 289. The method of claim ~~280~~, said first sample beam focusing or collecting being performed twice and within two different ranges of angles to a reference plane normal to a sample surface.

202 ²⁰¹ 290. The method of claim ~~280~~, said sample having different optically detectable properties along at least two axes, wherein said first sample beam focusing or collecting are performed twice employing at least two different apertures each aligned or centered respectively about one of said axes.

203 ²⁰² 291. The method of claim ~~290~~, wherein said at least two different apertures are substantially 90 degrees apart.

204 ²⁰² 292. A method for obtaining information of one or more layers of a sample, said method comprising:

focusing a first sample beam of radiation onto the one or more layers;

collecting radiation that originates from the first beam and that is modified by the one or more layers of the sample;

dispersing the radiation modified and collected from the sample to provide a spectrum;

focusing a polarized second beam of radiation at said one or more layers in a direction at an oblique angle to the one or more layers;

obtaining measurements of changes in polarization state in amplitude and phase of the radiation that has been modified by the one or more layers and that originates from the second beam; and

deriving information on optically detectable properties of said one or more layers from said measurements and the spectrum;

said first sample beam focusing or collecting being performed twice and within two different ranges of angles to a reference plane normal to a sample surface.

205 293. The method of claim 292, said sample having different optically detectable properties along at least two axes, wherein said first sample beam focusing or collecting are performed twice employing at least two different apertures each aligned or centered respectively about one of said axes.

206 294. The method of claim 293, wherein said at least two different apertures are substantially 90 degrees apart.

207 295. The method of claim 292, further comprising polarizing the first sample beam before it reaches the sample and/or analyzing the radiation modified by and collected from the sample, wherein said first sample beam focusing, collecting and dispersing are performed

twice, once with polarization states of the first sample beam and/or those of the modified and collected radiation within a first range of angles to a reference plane normal to a sample surface, and another time with said polarization states within a second different range of angles to the reference plane.

~~208~~ ²⁰⁷ ~~296~~ The method of claim ~~295~~, wherein said polarizing is performed with a polarizing element so that radiation of the first sample beam and/or the modified and collected radiation is polarized, with the polarizing element in two different positions when the first sample beam focusing, collecting and dispersing are performed twice.

~~209~~ ²⁰⁸ ~~297~~ The method of claim ~~296~~, wherein said two different positions are substantially 90 degrees apart by rotation.

~~210~~ ²⁰⁸ ~~298~~ The method of claim ~~296~~, further comprising polarizing the first sample beam before it reaches the sample, and analyzing the radiation modified by and collected from the sample, by a common polarizing element.

~~211~~ ²¹⁰ ~~299~~ The method of claim ~~298~~, wherein said polarizing and analyzing are performed by means of a polarizer or a polarizing beam splitter.

~~212~~ ²⁰⁴ ~~300~~ The method of claim ~~299~~, further comprising polarizing a beam of broadband radiation to provide said first sample beam, wherein said first sample beam focusing focuses said polarized first sample beam such that a beam having a multitude of polarization states is focused onto the sample, wherein said polarization states are functions of an angle ϕ to a reference plane normal to a sample surface, said angle ϕ having a range defining a substantial angle of an illumination aperture.

213 301. The method of claim 300, wherein said first sample beam focusing focuses said polarized first sample beam along different planes of incidence onto the sample, said planes being at different angles ϕ to the reference plane, the range of said angle of the illumination aperture being about 90 or 180 degrees.

214 302. The method of claim 301, the radiation in said first sample beam comprising at least one ultraviolet or deep ultraviolet wavelength.

215 303. The method of claim 302, further comprising:

providing a reference beam;

detecting the reference beam to provide a reference spectrum; and

wherein said deriving comprises comparing said spectrum and said reference spectrum to obtain said information of the sample.

216 304. An apparatus for obtaining information of one or more layers of a sample, said apparatus comprising:

optics focusing a first sample beam of radiation to the one or more layers, and a second sample beam of polarized radiation at said one or more layers in a direction at an oblique angle to the one or more layers, the radiation in said first beam comprising at least one ultraviolet or deep ultraviolet wavelength;

a collector collecting radiation that originates from the first beam and that is modified by the one or more layers of the sample;

a device dispersing the radiation modified and collected from the sample to provide a spectrum; and

an ellipsometer obtaining measurements of changes in polarization state in amplitude and phase of the modified radiation from the one or more layers originating from second beam;

wherein said information on optically detectable properties of said one or more layers is derivable from the measurements of the ellipsometer and the spectrum.

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~~305~~ The apparatus of claim ~~304~~, further comprising:

a source providing a reference beam;

a detector detecting the reference beam to provide a reference spectrum; and

wherein said information is derivable by a comparison of said spectrum and said reference spectrum.

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~~306~~ The apparatus of claim ~~304~~, further comprising a common polarizing element polarizing the first sample beam before it reaches the sample, and analyzing the radiation modified by and collected from the sample.

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~~307~~ The apparatus of claim ~~306~~, wherein said polarizing and analyzing are performed by means of a polarizer or a polarizing beam splitter.

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~~308~~ The apparatus of claim ~~304~~, further comprising a polarizing element polarizing a beam of broadband radiation to provide said first sample beam, wherein said optics focuses said polarized first sample beam such that a beam having a multitude of polarization states is focused onto the sample, wherein said polarization states are functions of an angle ϕ to a reference plane normal to a sample surface, said angle ϕ having a range defining a substantial angle of an illumination aperture.

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221 309. The apparatus of claim 308, wherein said optics focuses said polarized first sample beam along different planes of incidence onto the sample, said planes being at different angles ϕ to the reference plane, the range of said angle of the illumination aperture being about 90 or 180 degrees.

222 310. The apparatus of claim 304, further comprising at least two apertures, said sample having different optically detectable properties along at least two axes, wherein said first sample beam focusing or collecting are repeated employing at least two different apertures each aligned or centered respectively about one of said axes.

223 311. The apparatus of claim 310, wherein said at least two different apertures are substantially 90 degrees apart.

224 312. The apparatus of claim 304, wherein said first sample beam focusing, collecting, dispersing and deriving are performed twice, once with polarization states of the first sample beam and/or those of the modified and collected radiation within a first range of angles to a reference plane normal to a sample surface, and another time with said polarization states within a second different range of angles to the reference plane.

225 313. The apparatus of claim 304, further comprising a polarizing element polarizing the first sample beam before it reaches the sample, and/or analyzing the radiation modified by and collected from the sample to polarize the first sample beam and/or the modified and collected radiation, and an instrument moving the element between at least two different positions where the focusing, collecting and dispersing are performed.

226 314. The apparatus of claim 313, wherein said two different positions are substantially 90 degrees apart by rotation.

LAW OFFICES OF
SKJERNEN MORRILL LLP
3 EMBARCADERO CENTER
SUITE 2800
SAN FRANCISCO, CA 94111
(415) 217-6000
FAX (415) 434-0646

315. An apparatus for obtaining information of one or more layers of a sample, said apparatus comprising:

optics focusing a first sample beam of radiation to the one or more layers, and a second sample beam of polarized radiation at said one or more layers in a direction at an oblique angle to the one or more layers, the radiation in said first beam comprising at least one ultraviolet or deep ultraviolet wavelength;

a collector collecting radiation that originates from the first beam and that is modified by the one or more layers of the sample;

a device dispersing the radiation modified and collected from the sample to provide a spectrum;

a polarizing element polarizing the first sample beam before it reaches the sample and/or analyzing the radiation modified by and collected from the sample before such radiation is dispersed by the device;

an ellipsometer obtaining measurements of changes in polarization state in amplitude and phase of the modified radiation from the one or more layers originating from second beam;

wherein said information on optically detectable properties of said one or more layers is derivable from measurements of the ellipsometer and the spectrum; and

an instrument moving the element between at least two positions, so that polarization states of the first sample beam and/or those of the modified and collected radiation have different ranges of angles to a reference plane normal to a sample surface when said element is at said at least two positions.

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228 316. The apparatus of claim 315, wherein said two different positions are substantially 90 degrees apart by rotation.

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229 317. The apparatus of claim 315, said polarizing element polarizing the first sample beam before it reaches the sample, and analyzing the radiation modified by and collected from the sample.

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230 318. The apparatus of claim 315, wherein said polarizing element comprises a polarizer or a polarizing beam splitter.

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231 319. The apparatus of claim 315, wherein the polarizing element polarizes a beam of broadband radiation to provide said first sample beam, wherein said optics focuses said polarized first sample beam such that a beam having a multitude of polarization states is focused onto the sample, wherein said polarization states are functions of an angle ϕ to a reference plane normal to a sample surface, said angle ϕ having a range defining a substantial angle of an illumination aperture.

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232 320. The apparatus of claim 319, wherein said optics focuses said polarized first sample beam along different planes of incidence onto the sample, said planes being at different angles ϕ to the reference plane, the range of said angle of the illumination aperture being about 90 or 180 degrees.

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233 321. The apparatus of claim 315, the radiation in said first sample beam comprising at least one ultraviolet or deep ultraviolet wavelength.

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234 322. The apparatus of claim 315, further comprising:

a source providing a reference beam;

a detector detecting the reference beam to provide a reference spectrum; and

wherein information on optically detectable properties of the sample by a comparison of said spectrum and said reference spectrum.

235 323. The apparatus of claim 315, said focusing or collecting being performed twice and within two different ranges of angles to a reference plane normal to a sample surface.

236 324. The apparatus of claim 323, further comprising at least two different apertures, said sample having different optically detectable properties along at least two axes, wherein said optics focuses or the collector collects radiation through the at least two different apertures each aligned or centered respectively about one of said axes.

237 325. The apparatus of claim 324, wherein said at least two different apertures are substantially 90 degrees apart.

238 326. An apparatus for obtaining information of one or more layers of a sample, said apparatus comprising:

91 cont optics focusing a first sample beam of radiation to the one or more layers, and a second sample beam of polarized radiation at said one or more layers in a direction at an oblique angle to the one or more layers, the radiation in said first beam comprising at least one ultraviolet or deep ultraviolet wavelength;

a collector collecting radiation that originates from the first beam and that is modified by the one or more layers of the sample;

a device analyzing and dispersing the radiation modified and collected from the sample to provide a spectrum; and

an ellipsometer obtaining measurements of changes in polarization state in amplitude and phase of the modified radiation from the one or more layers originating from second beam;

wherein said information on optically detectable properties of said one or more layers from the measurements of the ellipsometer and the spectrum, and wherein said optics focuses radiation in the first sample beam or the collector collects radiation at at least two different times within two different ranges of angles to a reference plane normal to a sample surface.

239 327. The apparatus of claim 326, further comprising at least two different apertures, said sample having different optically detectable properties along at least two axes, wherein said optics focuses or the collector collects radiation from the first sample beam through the at least two different apertures each aligned or centered respectively about one of said axes.

240 328. The apparatus of claim 327, wherein said at least two different apertures are substantially 90 degrees apart.

241 329. The apparatus of claim 326, further comprising a polarizing element polarizing the first sample beam before it reaches the sample and/or analyzing the radiation modified by and collected from the sample, and an instrument moving the element between at least two positions where said first sample beam focusing, collecting and dispersing are performed, so that polarization states of the first sample beam and/or those of the modified and collected radiation have different ranges of angles to a reference plane normal to a sample surface when the element is at said at least two positions.

242 330. The apparatus of claim 329, wherein said at least two different positions are substantially 90 degrees apart by rotation.

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~~331~~ The apparatus of claim ~~329~~, said polarizing element polarizing the first sample beam before it reaches the sample, and analyzing the radiation modified by and collected from the sample.

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~~332~~ The apparatus of claim ~~331~~, wherein said polarizing element comprises a polarizer or a polarizing beam splitter.

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~~333~~ The apparatus of claim ~~329~~, said polarizing element polarizing a beam of broadband radiation to provide said first sample beam, wherein said optics focuses said polarized first sample beam such that a beam having a multitude of polarization states is focused onto the sample, wherein said polarization states are functions of an angle ϕ to a reference plane normal to a sample surface, said angle ϕ having a range defining a substantial angle of an illumination aperture.

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~~334~~ The apparatus of claim ~~333~~, wherein said optics focuses said polarized first sample beam along different planes of incidence onto the sample, said planes being at different angles ϕ to the reference plane, the range of said angle of the illumination aperture being about 90 or 180 degrees.

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~~335~~ The apparatus of claim ~~326~~, the radiation in said first sample beam comprising at least one ultraviolet or deep ultraviolet wavelength.

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~~336~~ The apparatus of claim ~~326~~, further comprising:

a source providing a reference beam;

a detector detecting the reference beam to provide a reference spectrum; and

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information on optically detectable properties of the sample is derivable from a comparison of said spectrum and said reference spectrum.

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337. The apparatus of claim 326, further comprising a xenon and/or deuterium lamp supplying radiation for the first sample beam.